REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claims 21-23 are being added. Support for these newly added claims may be found in the specification, inter alia, at page 8, lines 18-25; page 10, lines 25-26; page 11, lines 1-26; and page 12, lines 1-3.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 1-23 are now pending in this application.

Information Disclosure Statement

Applicants note that a new Information Disclosure Statement and SB/08 form was filed on July 28, 2005. Applicants respectfully request that the PTO consider the references cited on the SB/08 form and provide a signed and initialed copy of the SB/08 form with the next Office correspondence.

Claim Objections

The PTO objected to claims 3 and 8 for containing minor informalities. In this response, Applicants have amended claims 3 and 8 to overcome these objections. Accordingly, withdrawal of the claim objections is respectfully requested.

Rejection under 35 U.S.C. § 103

Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over JP 2002-283093 (hereafter "Tadauchi et al."). This rejection is respectfully traversed.

Claims 1, 6, 11, and 16 recite a lead-free joining material, solder paste, or joining method that includes a core part and a surface layer covering the core part that includes a "solid-solution phase in which a concentration of [an] additive element is higher than a concentration of the additive element in the core part, and the concentration of the additive element in the solid-solution phase is in a range of 0.6 % to 4.0 % by weight," and "a needle crystal which is more than a core part, is dispersed in the solid-solution phase and includes the zinc as a main component." Claims 2-5, 7-10, 12-15, and 17-20 depend upon claims 1, 6, 11, and 16.

In the Office Action, the PTO acknowledges that Tadauchi et al. may not disclose an additive element concentration, particularly of bismuth, of 0.6 % to 4.0 % by weight in the solid-solution phase of the surface layer, and that Tadauchi et al. may not disclose a needle crystal dispersed within the solid-solution phase including zinc as a main component. See Office Action at page 3. The PTO argues that the material disclosed by Tadauchi et al. would inherently have the same structures and properties as the claimed lead-free joining material because Tadauchi et al. discloses an identical or substantially identical manufacturing process. See Office Action at pages 3-4. As set forth in more detail below, Applicants respectfully disagree and submit that the process of Tadauchi et al. is not identical, that the differences in the processes produce structurally different products, and that the PTO's suggestion that the material of Tadauchi et al. inherently possesses the characteristics of the presently claimed invention is improper, certainly in the context of an obviousness rejection.

Tadauchi et al. does not disclose, teach, or suggest the claimed lead-free joining material. The manufacturing process disclosed in Tadauchi et al. is not identical or substantially identical to the exemplary process disclosed in the present application. Tadauchi et al. discloses a manufacturing process in which molten liquid is ejected through a nozzle into a cooling bath that is filled with mineral oil, causing the droplets to solidify into particles. See Tadauchi et al. at paragraphs 0023-0024. Applicants obtained and provide herewith a copy of a machine translation of Tadauchi et al. Reference to specific passages in Tadauchi et al. are based upon the machine translation. The cooling bath of mineral oil would provide a certain microstructure upon solidification of particles due to the cooling rate that is provided by the mineral oil. This cooling rate would be different than that disclosed by

way of example in Applicant's specification and would result in a different microstructure. For example, in Applicant's exemplary process, droplets of molten liquid are solidified in a highly pure inert gas atmosphere, resulting in a rapid solidification rate for the droplets. See specification at page 11, lines 14-26; page 12, lines 1-3. This exemplary method of solidification provides a different rate of solidification, and a person skilled in the art would readily recognize that this would result in a different microstructure than the material disclosed by Tadauchi et al. Therefore, the process disclosed by Tadauchi et al. is not identical or substantially identical and a person skilled in the art would not expect the materials of Tadauchi et al. to possess the presently claimed features.

Claims 1-20 are allowable over Tadauchi et al. for at least the reasons noted above. Furthermore, claims 5, 10, 15, 20, and 21 recite that an average concentration of the additive element in the whole lead-free joining material is in a range of 0.6 % to 1.0 % by weight. Tadauchi et al. discloses a tin-zinc alloy that further includes over 1 % and below 3 wt % of at least one of bismuth, silver, aluminum, magnesium, nickel, manganese, silicon, copper, zirconium, germanium, and niobium. See abstract of Tadauchi et al. Therefore, Tadauchi et al. discloses an alloy with a distinctly different additive element composition range than that recited in claims 5, 10, 15, 20, and 21. Furthermore, the material disclosed by Tadauchi et al. will have a different microstructure upon solidification than the material claimed by the Applicants because of the differences in composition between the material disclosed by Tadauchi et al. and the material claimed by the Applicants. This compounds the differences in microstructure due to the differences in manufacturing noted above. For example, the composition disclosed by Tadauchi et al. would not result in a material with a surface layer that has a solid-solution phase with an additive element concentration of 0.6 % to 4.0 % by weight. For at least these reasons, withdrawal of this rejection is respectfully requested.

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

Newly Added Claims

Claim 21 recites a lead-free joining material that includes "zinc and tin as major components, and at least any one of bismuth and germanium as an additive element, wherein an average concentration of the additive element in the lead-free joining material is in a range of 0.6 % to 1.0 % by weight." Tadauchi et al. does not disclose, teach, or suggest a lead-free joining material as recited in claim 21.

Claim 22 recites a method of making a lead-free joining material with the steps of "melting tin, zinc, and at least any one of bismuth and germanium as an additive element to form a molten liquid," "forming the molten liquid into droplets," and "solidifying the droplets into particles; wherein the particles include: (a) a core part that includes zinc and tin as major components and at least any one of bismuth and germanium as an additive element; and (b) a surface layer covering the core part that includes the major components and the additive element, the surface layer including; (i) a solid-solution phase in which a concentration of the additive element is higher than a concentration of the additive element in the core part, and the concentration of the additive element in the solid-solution phase is in a range of 0.6 % to 4.0 % by weight; and (ii) a needle crystal which is dispersed in the solid-solution phase and includes the zinc as a main component." Tadauchi et al. does not disclose, teach, or suggest a method of making a lead-free joining material with the steps recited in claim 22. Claim 23 depends from claim 22 and is allowable over Tadauchi et al. for at least these reasons.

Conclusion

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of

papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date 11/4/05 By _____

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